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ABSTRACT

The authors report the first year's evaluation findings on the Family Consultation Project, a transdisciplinary, noncategorical early intervention program serving infants at known or high risk for developmental disability due to genetic disorders or severe perinatal medical complications. The intervention program encouraged mutual pleasure in the parent-infant interaction and parents' sense of competence pursuant to the child's development. Families in the program for the infant's first 9 months scored higher than controls on measures of maternal responsiveness, comfort in interaction, verbal exchange, and pleasure in contact between members of the parent-infant dyad. On developmental assessments, controls fell further behind age appropriate levels of development, while infants in the intervention program improved. (Author/SB)

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RELATIONSHIP-FOCUSED INTERVENTION WITH HIGH-RISK INFANTS: FIRST-YEAR FINDINGS

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RELATIONSHIP-FUCUSED INTERVENTION WITH

HIGH-RISK INFANTS: FIRST-YEAR FINDINGS

An important distinction among infant intervention programs in developmental disabilities lies in who or what is selected as the primary focus of therapeutic activity. More traditional programs continue to emphasize direct educational/developmental stimulation of the child. Other programs now exist which primarily seek to train parents to assume a didactic or therapeutic role with the child. Finally, there are those programs dedicated to the enhancement of the parent-infant relationship as the primary means to promote both infant and parent competencies. In this view, warm, reciprocal relationships are seen as not only valuable in their own right but also as the basis for later development of exploration, language, and other cognitive skills. (For a review of these models, see Affleck, McGrade, and McQueeney, Note 1).

Among those programs sharing a primary emphasis in the promotion of adaptive arrangements in the parent-infant relationship, Bromwich's project with high-risk infants (Bromwich, 1979) and Fraiberg's work with parents and their congenitally blind infants (Fraiberg, 1970), both beginning in the latter part of the first year, are exemplary. Significantly, not only have Bromwich and Fraiberg shared a fundamental concern with fostering mutuality and reciprocal interactions between parent and infant but each has also given special recognition to the encouragement of parental self-confidence, autonomy, and control in developing strategies of professional consultation. In short the concern with adaptive relationships extends not only to the parent-infant dyad but also to the parent-professional partnership.

The Family Consulation Project, currently underway at the University of Connecticut Health Center, represents an effort to develop and evaluate relationship-focused intervention strategies for parents whose newborns are at high risk for developmental disabilities. The project is funded by the Connecticut State Department of Education as a model home-based service for children from birth to 3 years of age. Home visits by intervention staff are directed toward facilitating parent confidence and mutual pleasure in the parent-child interaction. Staff provide emotional support, encouragement of active coping efforts by parents, modelling of realistic and positive attitudes toward the child, and strategic suggestions for handling special needs. Normalization of the parent-infant relationship is sought, working from the parents' own perspective, rather than a redefinition of the parent as a task-oriented therapist.

Project evaluation measures follow from this intervention model, focusing on parent-infant interaction and parent attitudes as well as infant development. With the project completing its first year of operation, 9-month follow-up data are available for the earliest subjects in the treatment group and can be compared with 9-month data from subjects in a control group.

Method

Subjects and project design

To date, 68 treatment and control families have entered the Family Consultation Project. Parents are referred from three sources: 1) the Newborn Intensive Care Unit at the University of Connecticut Health Center (NICU),

2) this unit's Follow-up Clinic, and 3) the Genetic Counseling Service. These referrals form four groups as shown in Table 1. Follow-up data are now available

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Insert Table 1 about here

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from some subjects from the Genetics and NICU-2 Groups and initial data only for the NICU- 8 to 12 month Group.

Children in the Genetics Group have syndromes strongly associated with retardation. They are picked up when the syndrome is identified, typically in the newborn period. Trisomy 21 is the predominant diagnosis, but there are also other, more severe, trisomies, a chromosomal deletion syndrome, craniofacial anomalies presumably involving central nervous system malformation, and other disorders. The NICU-2 Group includes children who, during their stay in the Unit, had two or more medical problems associated with developmental disability. They are picked up at the time of hospital discharge.

The medical criteria, shown in Table 2, were chosen to reflect risk of

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central nervous system damage. A purely orthopedic or gastrointestinal problem would not, for example, be included. For a second group meeting these NICU criteria, intervention was begun at 8 to 12 months of age rather than at hospital discharge.

All parents whose infants meet these criteria are invited to participate

in the project--for treatment if they live within a specified geographic area or as controls if they live outside that area. Only 5 of 73 families approached have refused. All families, treatment and control, take part in research interviews and observations at the point of entry into the project and at subsequent 9-month intervals. All children are also scheduled for follow-up medical care and periodic developmental evaluations at the University of Connecticut Health Center, although this is on a fee-for-service basis and is not provided by the Family Consultation Project itself. Families may elect to receive their medical care elsewhere without affecting their participation in the intervention program itself.

Population characteristics

It should be emphasized that children served by the Family Consultation Project are more severely impaired than other populations which have been described as "at risk." Those in medical groups are among the sickest 30% of NICU survivors. Their prognosis at discharge is often highly guarded. To illustrate, among 51 NICU graduates who have entered the program to date, 5 have intraventricular shunts in place for hydrocephalus, 3 are microcephalic, 4 are totally blind and 3 others have significant visual impairment, 2 suffer significant hearing impairment, 7 show clear neuromotor abnormalities, and 13 others now demonstrate increased muscle tone. A number of others have labored breathing due to lung disease and require frequent hospitalization when mild infections lead to respiratory distress. A variety of other abnormalities (for example, deviant physical appearance) also threaten normal parent-infant interaction although they are not directly associated with developmental delay.

Some of the older children are functioning within normal limits, but their families remain anxious. Low socioeconomic status, minority group membership, and non-English speaking parents are overrepresented in the project population. Many are multi-problem families, with histories of alcoholism, psychiatric disturbance, removal of other children from the home, or family abuse.

Measures

Information about families is provided by primary nurses, physicians who provide follow-up care, and intervention staff, in addition to the periodic assessments by research personnel. Only the assessments done by research personnel will be discussed here, however. Agreement among the various information sources across observational situations has been reported elsewhere (McGrade, Allen, Affleck, and McQueeney, Note 2).

The 9-month research assessment, which is the focus of this report, is made in the home and includes: 1) A semi-structured interview to obtain report of parental[1] attitudes and perceptions; primarily caretaking concerns (adapted from Broussard and Hartner, 1970), as well as sources of parent and infant enjoyment and perceived infant capabilities. 2) Caldwell's (Note 3) Home Observation for Measurement of the Environment (HOME); a 45-item inventory containing 6 subscales designed to assess the quantity and quality of social, emotional, and cognitive stimulation in the child's environment. 3) Observational ratings of other aspects of parent-child interaction--the degree of pleasure in physical contact and closeness expressed by both mother and child and the contingency of maternal response to the child's distress (9-point scales),

adapted from Pedersen, Anderson, and Cain,(Note 4) and Yarrow, Cain, Pedersen, Rand, Fivel, and Abramson, (Note 5); and additional ratings of the presence of maternal imitation of the child's vocalizations or gestures (1 point for any evidence of each). 4) McNair, Lorr, and Droppleman's (Note 6) Profile of Mood States (POMS), a factor-analytically derived check-list for self report of recent mood yielding factor scores for Tension, Depression, Anger, Vigor, Fatigue, and Confusion. A total mood disturbance score from the POMS is calculated by subtracting the Vigor score from the sum of the other scores. 5) Perception of Baby Temperament Scales (Pedersen, Zastow, Cain, and Anderson, Note 7), a Q-sort measure which yields parent perceptions of their infants on factors of Activity, Rythmicity, Adaptability, Positive Mood, and Approach.

Design of first-year evaluation

For purposes of the first-year evaluation, the treatment group will be defined as all those families referred at the point of the baby's hospital discharge and/or genetic diagnosis and who received intervention at least until the research visit at the time the child was 9 months corrected age. There are are currently 12 such treatment children from two subgroups, 7 from the NICU-2 Group and 5 from the Genetics Group.

The number of control families who have been followed at least 9 months is presently too small to serve as an adequate contrast, but the treatments can be compared with those families who did not enter the program until the infant was 8 to 12 months corrected age. There are 19 families

at this later pick-up point. The major comparison, then, is between a group which has received Project intervention from discharge through the later evaluation point and a group which was not picked up until the later evaluation point.

Strictly speaking, it is not accurate to regard the latter group as having received no intervention during the first 8 to 12 months. The severity of the children's problems precludes the existence of a control population receiving no services at all. In fact, over a third of these children received some combination of educational and/or physical therapy services through regional centers for the retarded. These programs generally diverge considerably from the Family Consultation Project model in providing a more child-oriented, instructional approach.

Demographic characteristics of evaluation sample

Mean corrected ages at evaluation for treatment and control groups were 37.4 and 37.5 weeks, respectively, and groups did not differ significantly in gestational age at birth or length of initial hospital stay. Demographic characteristics for the two groups are shown in Table 3. Control fathers were

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Insert Table 3 about here

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more likely to be employed in professional positions and had more education than treatment fathers. Control mothers were also somewhat better educated than treatment mothers, although this difference did not reach significance. The groups did not differ significantly in sex ratios, number of first borns,

proportion of working mothers, or parental marital status.

The exclusion of genetics cases from the treatment group lowers the mean gestational age of treatments to 32.6 weeks, increases the mean length of their hospitalization to 10.9 weeks, and raises treatment fathers' educational level to a mean of 12.2 years. The remaining demographic factors are not appreciably altered. Because the character of the treatment group is changed by including the genetics cases, all analyses which follow have been conducted twice, with genetics cases included and excluded, and any discrepancies in findings are noted.

Results

Group comparisons on outcome measures

Eight of the home research visits were independently scored by two observers. Agreement on the HOME inventory was 92.5%, and reliability for additional parent-infant observation ratings was .90.

Group means for each of the outcome measures appear in Table 4. Of the HOME subscales, the groups differ significantly on only Subscale I, Emotional and Verbal Responsivity of the Mother (t=2.59, p=.015). A closer

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inspection of individual HOME items shows that the treatment group scores higher on a number of items pertaining to verbal interaction--mother's spontaneous vocalization to the child, contingent response to the child's

vocalizations, telling the child the name of some object or person in a "teaching" style and items pertaining to warm feelings about the child--praising child's qualities or behavior and conveying positive feeling when speaking of or to the child. Treatment mothers were also more likely than control mothers to kiss or caress their children during the visit, to look at their children and keep them within visual range, and to report that their children accompanied them on shopping trips. Although the variety of play materials available to the children in treatment and control homes did not differ, treatment mothers were more likely to provide toys or interesting activities for the child during the interview. Finally, more treatment mothers discussed or demonstrated activities which reflected conscious encouragement of their child's developmental advance.

Analysis of the additional parent-infant observation ratings yielded significantly higher scores for treatment mothers than controls on ratings of maternal closeness and physical contact ($t = 2.68$, $p = .012$), contingency of maternal response to child's distress where distress occurred ($t = 2.76$, $p = .012$), and maternal imitation of the child's vocalizations and gestures ($t = 2.43$, $p = .023$). Treatment and control mothers did not differ in their scores on the POMS, nor did they differ significantly in their perceptions of their babies' temperaments or in the frequencies with which they reported current and past caretaking problems. (Although some of the differences with respect to frequency of report of caretaking problems appear rather large in Table 5, none are significant in chi square tests.)

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Open-ended interview questions were category-coded. Groups did not differ in types of activities parents mentioned as being most enjoyable for their infant or for themselves in interacting with the infants. All parents felt that their infants responded differently to them than they did to others,but groups differed in the types of infant behaviors they cited as evidence of the child's differential response. Although treatment parents mentioned negative behaviors (e.g., stranger anxiety, crying and lack of soothing for others) about as often as control parents did, treatment parents were more likely to also cite positive child behaviors (e.g., smiling or vocalizing more for the parent, excitement on reunion, differential visual regard) as indicating discrimination (corrected $\chi^2 = 7.43$, $p = .006$). As a consequence, treatment parents volunteered a greater number of distinct infant behaviors to support their belief in their child's ability to distinguish them from others ($t = 1.76$, one-tailed $p < .05$).

Exclusion of genetics cases from the treatment group does not appreciably alter the pattern of findings. A significant difference does appear in the ratings of infants' pleasure in physical contact, with treatment babies ($M = 7.50$) demonstrating greater pleasure ($t = 1.94$, one-tailed $p < .05$).

Contributions from demographic variables

As demographic extremes pervade this sample, it seemed likely that demographic differences among families could influence scores on outcome measures and that certain types of families might show greater response to

treatment relative to controls. Analyses of variance on outcome measures were conducted to investigate these issues with group assignment and demographic status as independent variables.

The child's sex accounted for a significant proportion of the variance in HOME Subscale III, Organization of the Physical and Temporal Environment, (F (1,27)= 4.56, p= .042) with female children having more stable environments than male children. When genetics cases were excluded from the treatment group, mothers of girls rated their infants as more likely to approach new objects and situations (F (1,22)= 4.54, p= .044), but mothers of girls reported higher levels of tension than did mothers of boys (F (1,22)= 4.16, p= .054). None of the outcome measures proved to be a function of whether the child was first- or later- born. Treatment-control differences were also unrelated to the child's sex or birth order.

Although none of the outcome scores was influenced by whether the mother worked or stayed home with her child, working mothers did show relatively better response to treatment than nonworking mothers on measures of maternal tension (F (1,27)= 5.43, p= .027) and fatigue (F (1,27)= 3.66, p= .067; with genetics excluded, F (1,22)= 4.14, p= .054). Although nonworking treatment mothers reported about the same levels of tension and fatigue as nonworking control mothers, working treatment mothers reported less tension and fatigue than working controls. Mothers with at least a high school education rated their infants' temperaments higher in positive mood (F (1,27)= 19.51, $p < .001$) and tended to provide more stable environments (HOME III: F (1,27)= 3.37, p= .077; excluding genetics cases, F (1,22)= 5.30, p= .031) than did

mothers with less than a high school education.

Families in which the father's occupation was nonprofessional had higher total HOME scores than families in which the father held a professional position (F (1,18)= 6.57, p= .020). These families scored significantly higher on HOME subscales Emotional and Verbal Responsivity of Mother, Maternal Involvement with Child, and Opportunities for Variety in Daily Stimulation. It is possible that these results are associated with the absence of treatment fathers from the professional category. When genetics cases were excluded, women with less educated husbands rated their infants as more adaptable (F (1,17)= 5.03, p= .039) and more likely to approach new objects and situations (F (1,17)= 6.08, p= .025).

Higher scores on HOME subscale VI, Opportunities for Variety in Daily Stimulation, were achieved in two-parent households than in single-parent households (F (1,21)= 4.72, p= .041), which is primarily due to the fact that some items on this subscale require the father's daily presence for a positive score. In two-parent households, as opposed to single-parent households, infants were perceived by their mothers as being significantly more active (F (1,27)= 5.85, p= .023), and mothers tended to report themselves as somewhat (p= .06) less tense and depressed. Several interactions between group and marital status suggest that single mothers may derive greater benefit from treatment relative to controls than married mothers, but with only two single treatment mothers, it is difficult to be confident of these results.

Effects of geographic distribution

The treatment group in this sample resides exclusively within a specified geographic area, necessitated by consideration of frequent travel by

intervention staff. The control group is divided almost equally between families who reside outside the area and families within the area (who became treatment families after these data were collected). To determine whether the geographic difference was associated with differences on aspects of mother-infant interaction studied, controls living outside the geographic catchment area were excluded along with genetics cases so that control and treatment groups were comparable in both region of residence and perinatal medical status. Outcome data was uneffected with one exception: Control group scores on HOME subscale V, Maternal Involvement with Child, became still lower ($\underline{M}$ = 2.63), making the group difference significant ($\underline{t}$= 2.36, $\underline{p}$= .038). This produced a significant difference in HOME total scores ($\underline{t}$ = 2.25, $\underline{p}$= .043) favoring the treatment group. A possible explanation of this result, as well as the group demographic differences noted earlier, is the higher incidence of poor, inner-city areas within the catchment region.

Developmental evaluations

Behavioral assessments of development are normally scheduled for all infants at 4 and 8 months corrected age as a part of their routine appointments in the NICU Follow-up Clinic. These assessments are in the form of The Comprehensive Developmental Evaluation Chart (Cliff, Carr, Gray, Nymann, and Redding, Note 8), designed particularly for use with young children with developmental delays. It provides for a number of qualitative observations as well as functional age equivalents for gross motor, manipulation, feeding, receptive language, expressive language, and cognitive-social areas. For purposes of the

present study, an overall developmental index was calculated as the ratio of the average functional age across performance areas to the child's corrected age, multiplied by 100.

Genetics cases were excluded from the analysis of developmental data because of the expected difference in developmental course for these subjects who were represented in only the treatment group. Both 4- and 8- month developmentals were available for 6 of the remaining 7 treatment subjects and 15 of the 19 controls. The mean developmental index for the control group was 10 points higher than that for the treatment group at 4 months, but by 8 months the treatment group scored an average of nearly 8 points higher than the controls. (See Figure 1.) Neither of these differences reached significance relative

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to the high variance within groups.

Discussion

Children in the present study were not only at risk for developmental delay from perinatal or genetic condition but also because of attendant threats to parent-infant reciprocity. For example, parents' interactions with their infants may be distorted by the infant's pre- or post- maturity (Field, 1979), by the infant's unpredictability or difficult-to-interpret cues (Freudenberg, Driscoll, and Stern, 1978; Stone and Chesney, 1978), or by lengthy initial separations (Klaus and Kennell, 1976; Leifer, Leiderman, Barnett, and Williams, 1972) or emotional crises (Connor, Williamson, and Siepp, 1978) such as are

occasionned by the infant's early hospitalization.

The relationship-focused early intervention of the Family Consultation Project produced gains that fall within the general categories of maternal responsiveness, comfort in interaction, and pleasure in contact between members of the parent-infant dyad. Verbal interaction, and notably contingent maternal verbal response, was enhanced. In this sample of extremely high-risk infants, controls fell further behind their corrected age-appropriate levels of development from 4 to 8 months, while infants receiving intervention improved.

These findings complement previously reported relationships between mother-infant interaction and later infant competence in samples of preterm infants (Bromwich, 1979; Cohen and Beckwith, 1979), low income families (Shaefer, Note 9), and handicapped children (Brassell, 1977). The data from the present study also point out demographic influences on parent-infant interaction and suggest that certain groups, possibly those who might find caring for a high-risk infant most overwhelming, may show relatively greater benefit from intervention.

Clearly, longer term advantage for intervention families cannot at present be predicted. A 3-year follow-up of these families is presently being planned and will include relationship and emotional measures as well as language and cognitive assessments.

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Footnotes

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1 Fathers were present at and contributed to several of the interviews, but their number was not sufficient to permit separate consideration. The data reflect views of the mother or both parents, except where parents disagreed, in which case the mother's view is used here.

Table 1

Group Distinctions

Group*	Pickup Point	Criteria
Genetic	At identification	Genetic syndrome associated with retardation
NICU-2	At hospital discharge	2 medical criteria perinatally
NICU-1	At hospital discharge	1 medical criterion perinatally
NICU-8 to 12 months	8 to 12 months corrected age	2 medical criteria perinatally

* Each group is further divided as treatment or control

Table 2

Medical Criteria

Birth weight below 1250 grams
Seizures
Intraventricular hemorrhage
Perinatal asphyxia
Marked hypotonia or hypertonia
Significant medical problems (e.g., meningitis, bronchopulmonary dysplasia, cardiac problems other than patent ductus arteriosus)
Significant sensory impairment (e.g., vision, hearing)

Table 3

Demographic Characteristics of One-year Evaluation Sample

	Means (S.D.)				Ns	
	Treatment	Control			Treatment	Control
Corrected age at research visit (weeks)	37.42 (3.42)	37.53 (6.72)	Child's sex	Male:	6	11
				Female:	6	8
Gestational age at birth (weeks)	34.83 (6.69)	33.32 (4.81)	Birth order	First-born:	5	9
				Later-born:	7	10
Length of initial hospitalization (weeks)	6.67 (7.18)	7.53 (3.50)	Mother employed	Yes:	3	7
				No:	9	12
Mother's education (years)	10.33 (2.81)	11.95 (1.39)	Father's occupation	Professional:	0	5
				Non-professional:	10	11
Father's education (years)*	10.60 (2.50)	12.60 (1.77)	Marital status	Married or living together:	10	14
				Single, separated or divorced:	2	5

* $p < .05$

Table 4

Group Means for Outcome Measures

	Treatment	Control
HOME Subscales		
I. Emotional & Verbal Responsivity of Mother*	10.00	8.16
II. Avoidance of Restriction & Punishment	6.75	6.63
III. Organization of Physical & Temporal Environment	5.67	5.37
IV. Provision of Appropriate Play Materials	5.92	6.21
V. Maternal Involvement with Child	4.83	4.00
VI. Opportunities for Variety in Daily Stimulation	2.17	2.12
HOME Total	35.33	32.47
Maternal closeness & physical contact*	7.17	5.47
Infant pleasure in closeness & contact	7.67	6.06
Contingency of maternal response to distress*	6.91	6.16
Imitation of baby's vocalizations & gestures*	1.08	.47

	Treatment	Control
POMS Subscales		
Tension	4.33	5.84
Depression	6.75	6.99
Anger	6.75	9.26
Vigor	17.50	17.58
Fatigue	5.25	7.89
Confusion	1.92	2.53
Total Mood Disturbance	7.50	14.84
Temperament Subscales		
Activity	23.92	23.84
Rythmicity	21.83	22.84
Adaptability	23.75	22.95
Positive Mood	24.92	23.88
Approach	24.50	24.21

*$p < .025$

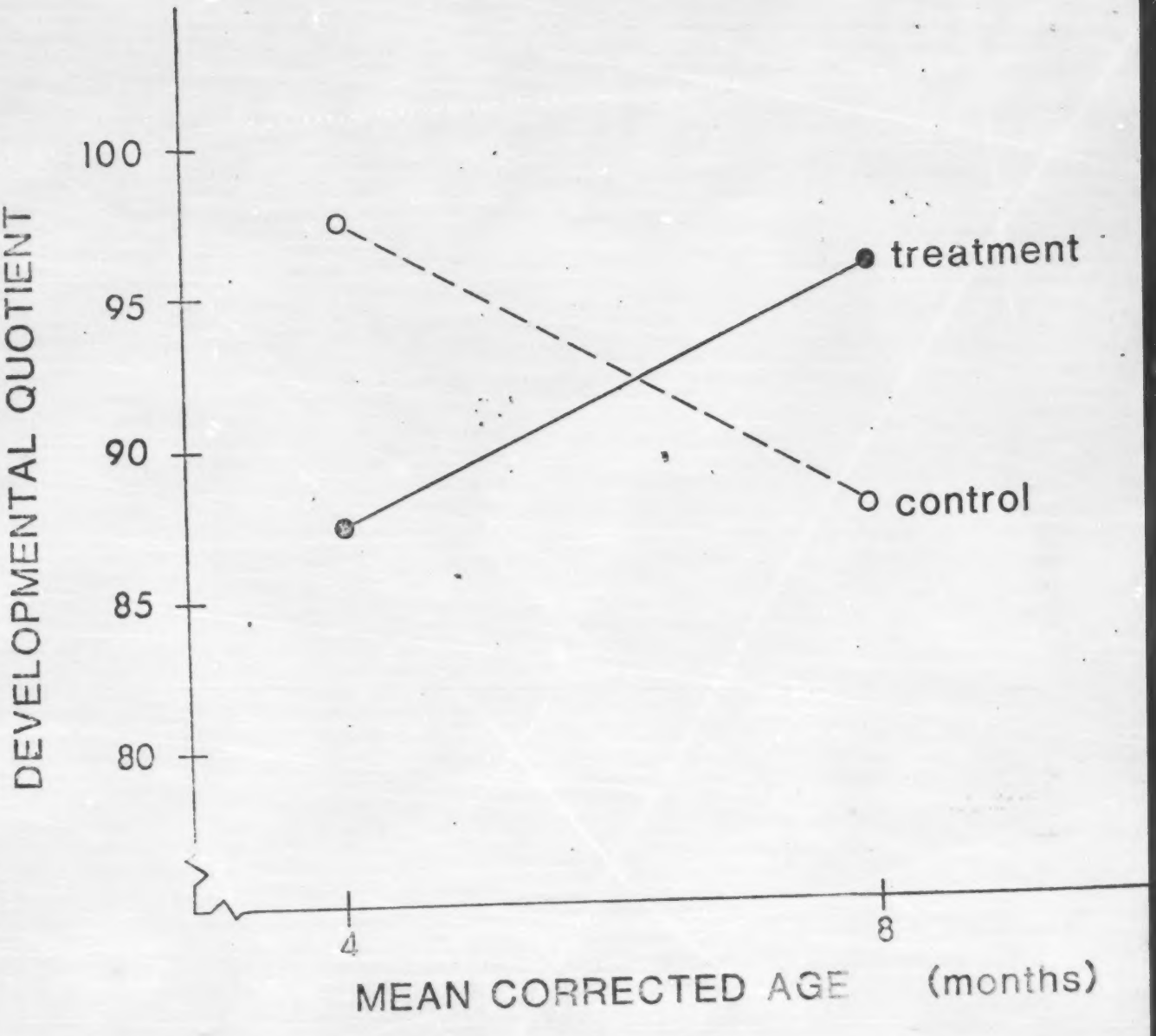
Table 5

Percentages of Mothers Reporting Current and Past Caretaking Problems

	Current		Past	
	Treatment	Control	Treatment	Control
Caretaking area				
Crying	0%	10.5%	8.3%	37.5%
Feeding	8.3%	5.3%	25.0%	25.0%
Vomiting	0%	10.5%	16.7%	31.3%
Sleep Schedule	25.0%	5.3%	25.0%	25.0%
Bowel Movements	25.0%	15.8%	33.3%	31.3%

Figure Caption

Figure 1. Mean developmental quotients by group at 4 and 8 months corrected age.


DEVELOPMENTAL QUOTIENT
100
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treatment
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MEAN CORRECTED AGE (months)